Claims

We claim:

1. A method for analyzing an image, comprising:

receiving data describing an image, wherein the image is defined in a bounded n-dimensional space, wherein the image is embedded in an m-dimensional real space via an embedding function x(), and wherein $m > n$;

determining a diffeomorphism (f,g) of the n-dimensional space;

computing the inverse transform (f^{-1},g^{-1}) of the determined diffeomorphism (f,g);

selecting a plurality of points in the n-dimensional space;

mapping the plurality of points onto the image using $x(f^{-1},g^{-1})$ thereby generating a mapped plurality of points on the image; and

analyzing the mapped plurality of points to determine characteristics of the image.

2. The method of claim 1,

wherein the plurality of points comprise a Low Discrepancy Sequence;

wherein the mapped plurality of points comprises a mapped Low Discrepancy Sequence.

3. The method of claim 1, further comprising:

generating output comprising the mapped plurality of points.

4. The method of claim 1, wherein said analyzing comprises detecting one or more edges in the image.

5. The method of claim 1, wherein the bounded n-dimensional space comprises a unit n-cube.

6. The method of claim 5, wherein n = 2, and wherein the n-cube comprises a unit square.

7. The method of claim 5, wherein n = 3, and wherein the n-cube comprises a unit cube.

8. The method of claim 5, wherein n > 3, and wherein the n-cube comprises a hyper-cube of dimensionality greater than 3.

9. The method of claim 1,

wherein the image comprises a Riemannian manifold, and wherein the received data comprises a Riemannian metric of the image.

10. The method of claim 1,

wherein the received data comprises an intensity function of the image.

11. The method of claim 1,

wherein the image comprises a 3-dimensional image;

wherein said analyzing comprises analyzing the mapped plurality of points to determine one or more characteristics of the 3-dimensional image.

12. The method of claim 1,

wherein the image comprises an n-dimensional image, wherein n is greater than 3; and

wherein said analyzing comprises analyzing the mapped plurality of points to determine one or more characteristics of the n-dimensional image.

13. The method of claim 1,

wherein said analyzing the mapped plurality of points to determine characteristics of the image comprises performing pattern recognition on the image.

14. A method for generating a Low Discrepancy Sequence on an image, comprising:

receiving data describing an image, wherein the image is defined in a unit n-cube, wherein the image is embedded in an m-dimensional real space via an embedding function x(), and wherein $m > n$;

determining a diffeomorphism (f,g) of the unit n-cube;

computing the inverse transform (f^{-1},g^{-1}) of the determined diffeomorphism (f,g);

selecting a Low Discrepancy Sequence in the unit n-cube;

mapping the Low Discrepancy Sequence onto the image using $x(f^{-1},g^{-1})$, thereby generating a Low Discrepancy Sequence on the image; and

generating output comprising the mapped Low Discrepancy Sequence.

15. The method of claim 14, further comprising:

analyzing the mapped Low Discrepancy Sequence to determine one or more characteristics of the image.

16. The method of claim 15,

wherein said analyzing comprises detecting one or more edges in the image.

17. The method of claim 15,

wherein said analyzing comprises performing pattern recognition on the image.

18. The method of claim 15,

wherein the image comprises a 3-dimensional image;

wherein said analyzing comprises analyzing the mapped plurality of points to determine one or more characteristics of the 3-dimensional image.

19. The method of claim 15,

wherein the image comprises an n-dimensional image, wherein n is greater than 3; and

wherein said analyzing comprises analyzing the mapped plurality of points to determine one or more characteristics of the n-dimensional image.

20. The method of claim 14, wherein n = 2, and wherein the unit n-cube comprises a unit square.

21. The method of claim 14, wherein n = 3, and wherein the unit n-cube comprises a unit cube.

22. The method of claim 14, wherein n > 3, and wherein the unit n-cube comprises a unit hyper-cube of dimensionality greater than 3.

23. The method of claim 14,

wherein the received data comprises an intensity function of the image.

24. The method of claim 14,

wherein the image comprises a Riemannian manifold, and wherein the received data comprises a Riemannian metric of the image.

25. A system for analyzing an image, comprising:

a sensor; and

a computer which is operable to couple to said sensor, said computer comprising:

a CPU;

a memory medium which is operable to store program instructions; and

an input for receiving data describing an n-dimensional image, wherein the image is defined in a bounded n-dimensional space, wherein the image is embedded in an m-dimensional real space via an embedding function x(), and wherein $m > n$;

wherein the CPU is operable to execute said program instructions to perform:

determining a diffeomorphism f of the n-dimensional space;

computing the inverse transform f^{-1} of the determined diffeomorphism f;

selecting a plurality of points in the n-dimensional space;

mapping the plurality of points onto the image using $x(f^{-1})$, thereby generating a mapped plurality of points on the image;

wherein said computer and said sensor are operable to perform:

sampling the image using at least a subset of the mapped plurality of points to generate samples of the image; and

wherein the CPU is further operable to execute said program instructions to perform:

analyzing the samples of the image to determine characteristics of the image.

26. The system of claim 25,

wherein the plurality of points comprises a Low Discrepancy Sequence;

wherein the mapped plurality of points comprises a mapped Low Discrepancy Sequence.

27. The system of claim 25, wherein the CPU is further operable to execute said program instructions to perform:

generating output comprising the mapped plurality of points.

28. The system of claim 25, wherein the bounded n-dimensional space comprises a unit n-cube.

29. A system for analyzing a image, comprising:

a computer, comprising:

a CPU;

a memory medium which is operable to store program instructions; and

an input for receiving data describing an n-dimensional image, wherein the image is defined in a bounded n-dimensional space, wherein the image is embedded in an m-dimensional real space via an embedding function x(), and wherein $m > n$;

wherein the CPU is operable to execute said program instructions to perform:

determining a diffeomorphism f of the n-dimensional space;

computing the inverse transform f^{-1} of the determined diffeomorphism f;

selecting a Low Discrepancy Sequence in the n-dimensional space; and

mapping the Low Discrepancy Sequence onto the image using $x(f^{-1})$, thereby generating a mapped Low Discrepancy Sequence on the image;

sampling the image using at least a subset of the mapped Low Discrepancy Sequence to generate samples of the image; and

analyzing the samples of the image to determine characteristics of the image.

30. The system of claim 29,

wherein the image comprises an image of an object;

wherein said analyzing comprises analyzing the samples of the image to determine one or more characteristics of the object.

31. A system for generating a Low Discrepancy Sequence on an image, comprising:

a computer, comprising:

a CPU;

a memory medium which is operable to store program instructions; and

an input for receiving data describing an n-dimensional image, wherein the image is defined in a unit n-cube, wherein the image is embedded in $\mathbf{R}^m$ via an embedding function x(), and wherein m > n;

wherein the CPU is operable to execute said program instructions to perform:

determining a diffeomorphism f of the unit n-cube;

computing the inverse transform f^{-1} of the determined diffeomorphism f;

selecting a Low Discrepancy Sequence in the unit n-cube;

mapping the Low Discrepancy Sequence onto the embedded image using $x(f^{-1})$, thereby generating a Low Discrepancy Sequence on the image; and

generating output comprising the mapped Low Discrepancy Sequence.

32. A memory medium containing program instructions for analyzing an image, wherein said program instructions are executable to perform:

receiving data describing an n-dimensional image, wherein the image is defined in a bounded n-dimensional space, wherein the image is embedded in an m-dimensional real space via an embedding function x(), and wherein m > n;

determining a diffeomorphism f of the n-dimensional space;

computing the inverse transform f^{-1} of the determined diffeomorphism f;

selecting a plurality of points in the n-dimensional space;

mapping the plurality of points onto the image using $x(f^{-1})$, thereby generating a mapped plurality of points on the image;

sampling the image using at least a subset of the mapped plurality of points to generate samples of the image; and

analyzing the samples of the image to determine characteristics of the image.

33. The method of claim 32,

wherein the plurality of points comprises a Low Discrepancy Sequence;

wherein the mapped plurality of points comprises a mapped Low Discrepancy Sequence.

34. A memory medium containing program instructions for analyzing an image, wherein said program instructions are executable to perform:

receiving data describing an image, wherein the image is defined in a bounded n-dimensional space, wherein the image is embedded in an m-dimensional real space via an embedding function x(), and wherein $m > n$;

determining a diffeomorphism f of the n-dimensional space;

computing the inverse transform f^{-1} of the determined diffeomorphism f;

selecting a Low Discrepancy Sequence in the n-dimensional space;

mapping the Low Discrepancy Sequence onto the image using $x(f^{-1})$, thereby generating a mapped Low Discrepancy Sequence on the image; and

sampling the image using at least a subset of the mapped Low Discrepancy Sequence to generate samples of the image; and

analyzing the samples of the image to determine characteristics of the image.

35. The memory medium of claim 34,

wherein the image comprises a image of an object;

wherein said analyzing comprises analyzing the samples of the image to determine one or more characteristics of the object.

36. A memory medium containing program instructions for generating a Low Discrepancy Sequence on an image, wherein said program instructions are executable to perform:

selecting an image S, wherein S is defined in a unit n-cube, wherein S is embedded in $\mathbf{R}^m$ via an embedding function x(), and wherein $m > n$.

determining a diffeomorphism f of the unit n-cube;

computing the inverse transform f^{-1} of the determined diffeomorphism f;

selecting a Low Discrepancy Sequence in the unit n-cube;

mapping the Low Discrepancy Sequence onto the embedded image S using $x(f^{-1})$, thereby generating a Low Discrepancy Sequence on the image S; and

generating output comprising the mapped Low Discrepancy Sequence.

5